

## REMARKS

### Status of Claims

Claims 6-18 remain pending and under examination on the merits in the present divisional patent application. Claim 6 has been amended to more clearly identify the novel features of the present invention. Claims 8 and 18 have each been amended to correct a typographical error. As discussed further below, Claims 19-26 are currently withdrawn from consideration pursuant to an election. Claims 1-5 remain cancelled.

### Election

By telephonic restriction requirement on September 1, 2004, and as repeated at pages 2-6 of the first Office Action, the Examiner has required election from among the following groups of claims:

Group I – Claims 6-18 (method for producing an unsaturated carboxylic acid);

Group II – Claims 19-21 (method for producing an unsaturated carboxylic acid);  
and

Group III – Claims 22-26 (method for producing an unsaturated nitrile).

The Examiner also required election of species to narrow down the number of possible alkane compositions in the gas feed stream.

Applicants hereby confirm the previous telephonic election of Group I (Claims 6-18) and the C<sub>2</sub>-C<sub>4</sub> alkanes for further prosecution at this time, without traverse and without relinquishing or limiting their right to file one or more later divisional applications directed to one or more of the unelected groups of claims (II and III).

### Specification and Claim Amendments

Independent Claim 6 has been amended as follows.

The unsaturated carboxylic acid products and reactant alkanes have been limited to lower alkanes, i.e., those “having from 3 to 8 carbon atoms”, which is supported by

the disclosure at the top of page 10, as well as at the bottom of page 18, of the present specification and, as discussed in further detail hereinafter, the general knowledge of persons of ordinary skill in the art.

Additionally, Claim 6 has been amended such that the process of the present invention comprises contacting an alkane having from 3 to 8 carbon atoms with a catalyst system comprising a first catalyst and a second catalyst, and said first catalyst is now restricted to comprising a reducible metal oxide promoted with a Group 8 promoter metal, along with listings of suitable metals for the oxide and suitable Group 8 promoter metals. This amendment is supported by the subject matter of original Claims 4 and 5, as well as the disclosure provided in the present specification, for example, at pages 9 and 12, as well as Example 3 (zinc orthovanadate).

Lastly, each of Claims 8 and 18 have been amended to correct a typographical error whereby the element palladium had inadvertently been omitted from the possible constituents of the mixed metal oxide of the second catalyst. Thus, each of Claims 6 and 8, as well as relevant portions of the present specification, have been amended to include the element palladium ("Pd") as a possible constituent element of the mixed metal oxide catalyst (i.e., variable "X").

#### Claim Rejections Under 35 U.S.C. § 112, first paragraph

On pages 6-7 of the Office Action, Claims 6-18 have been rejected, under 35 U.S.C. § 112, first paragraph, based on the Examiner's assertion that the unsaturated carboxylic acid products and the reactant alkanes are each too broadly recited in the claims and that the each of these broad categories of compounds is not supported and enabled by the disclosure and description provided in the present specification. More particularly, in paragraph 5 of the Office Action the Examiner suggests amending the claims to recite unsaturated carboxylic acid products and reactant alkanes having a particular number of carbon atoms, respectively. Furthermore, in paragraph 6, the Examiner asserts that the disclosure and examples of the present specification support the production of only unsaturated carboxylic acids having three carbon atoms.

It is respectfully submitted that it is common knowledge in the chemical arts and among persons of ordinary skill in the art, that the lower alkanes (i.e., alkanes having from as low as 1 carbon atoms to as many as 8 carbon atoms), have similar physical and reactive characteristics. See, for example, Morrison and Boyd, Organic Chemistry, Sixth Ed., Chapter 3, Prentice Hall, Englewood Cliffs, New Jersey (1992), pp 77-78, 92-94, and 102-103 (copies attached hereto). The amount of experimentation required to apply the method of the present invention for producing unsaturated carboxylic acid having from 3 to 8 carbon atoms from reactant alkane having from 3 to 8 carbon atoms is not extensive or complicated. Thus, it is respectfully submitted that the examples presented in the present application are well sufficient to support the recitation in amended independent Claim 6 of reactant alkanes "having from 3 to 8 carbon atoms". Similarly, the present specification explains, at the bottom of page 11, that the method of the present invention is concerned with production of "corresponding" product alkenes and "corresponding" product unsaturated carboxylic acids, which means that the products have the same number of carbon atoms as the reactant alkane. Thus, the recitation in amended independent Claim 6 that the method is for the production of an unsaturated carboxylic acid "having from 3 to 8 carbon atoms" is consistent with the use of a reactant alkane having from 3 to 8 carbons atoms.

It is believed that the foregoing amendments and explanation adequately address the rejection, under 35 U.S.C. § 112, first paragraph, of independent Claim 6, as well as dependent Claims 7-18 which each depend directly or indirectly therefrom and, therefore, withdrawal of this rejection is hereby respectfully requested.

#### Claim Rejections Under 35 U.S.C. § 103(a)

Claims 6-18 have been rejected, under 35 U.S.C. § 103(a), as being obvious and unpatentable in view of Karim et al. (US 6,531,631) (see pages 10-13 of the first Office Action). Applicants respectfully traverse this rejection for the reasons which follow.

The present invention, as recited in amended independent Claim 6, relates to a method for producing an unsaturated carboxylic acid having from 3 to 8 carbon atoms

comprising comprises contacting, in a reaction zone, a feed gas stream comprising an alkane having from 3 to 8 carbon atoms with a catalyst system comprising a first catalyst component and a second catalyst component. In particular, the first catalyst component is capable of catalyzing the conversion of an alkane to a product comprising a corresponding product alkene and unreacted alkane and the second catalyst component is capable of catalyzing the conversion of an alkane to a product comprising a corresponding unsaturated carboxylic acid and is also capable of catalyzing the conversion of an alkene to a product comprising a corresponding product unsaturated carboxylic acid. Furthermore, recited in amended independent Claim 6, the first catalyst component is different from the second catalyst component, and the first catalyst comprises a reducible metal oxide promoted with a Group 8 promoter metal, wherein selected metals are listed as suitable bases for the reducible metal oxide and suitable Group 8 promoter metals are also listed.

The document cited by the Examiner, i.e., Karim et al., fails entirely to suggest in any way the use of a two-catalyst system wherein one catalyst ("a first catalyst component") convert alkanes to alkenes and the other catalyst ("a second catalyst component"), which is different from the first catalyst, converts each of the alkane and alkene to corresponding unsaturated carboxylic acids. Moreover, Karim et al. also entirely fails to suggest the use of a dehydrogenation catalyst as the first catalyst which comprises a reducible metal oxide promoted with a Group 8 promoter metal.

In view of the above-discussed claim amendments and discussion, it is believed that the subject matter of amended independent Claim 6 is not made obvious by the disclosure of Karim et al. and, therefore, that amended independent Claim 6, as well as Claims 7-18, which each depend directly or indirectly therefrom, are patentable over Karim et al. Withdrawal of this rejection is hereby respectfully requested.

Double Patenting Rejections

On pages 13-15, Claims 6-8 have been rejected under the judicially created doctrine of obviousness-type double patenting, based upon Claim 1 of Lin et al. US 6,180,825 and Bogan et al. US Appln No. 09/962,998. Applicants respectfully traverse these rejections for the reasons which follow.

Claim 1 of Lin et al. US 6,180,825 recites a process for preparing an unsaturated aldehyde or carboxylic acid comprising subjecting an alkane to catalytic oxidation in the presence of a catalyst including a compound of the specified formula and prepared by the recited process steps.

Claim 1 of Bogan et al. recites a method for producing an unsaturated carboxylic acid comprising the steps of (a) contacting, in a reaction zone, an alkane with a catalyst containing a mixed metal oxide of the specified formula, (b) recovering unreacted alkane and product alkene and (c) recycling same to the reaction zone.

Neither of the aforesaid claimed processes is not of the same scope as the method recited in independent Claim 6 of the present application, which requires the use of a catalyst system comprising a first catalyst component capable of catalyzing conversion of alkanes to alkenes and a second catalyst component, different from the first catalyst component and capable of catalyzing the conversion of both the alkane and product alkene to an unsaturated carboxylic acid. Furthermore, neither Claim 1 of Lin et al., nor Claim 1 of Bogan et al., recites or covers a two-catalyst system wherein one of the catalysts comprises a reducible metal oxide promoted with a Group 8 promoter metal. Thus, it is respectfully submitted that there is no double patenting concern presented by Claim 1 of Lin et al. or Claim 1 of Bogan et al. It is believed that amended independent Claim 6, as well as Claims 7-18 which each depend directly or indirectly therefrom, are patentably distinct and allowable over each of Lin et al. and Bogan et al.

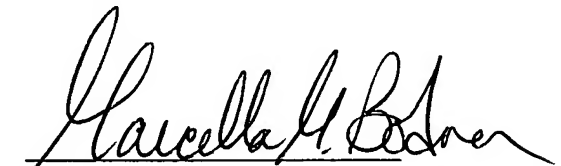
Withdrawal of these double patenting-type rejections is hereby respectfully requested.

**CONCLUSION**

Based upon the foregoing amendments and explanations, Applicants and their attorney hereby respectfully request re-examination and allowance of amended Claims 6, 8 and 18, as well as Claims 7 and 9-17.

No fees are believed to be due in connection with the filing of this Amendment. If however, any such fees are due, including extension and petition fees, in connection with the submission of this Amendment, the Examiner is hereby authorized to charge them, as well to credit any overpayments, to **Deposit Account No. 18-1850**.

Respectfully submitted,



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